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CLEAN AIR ACT

MULTIMEDIA COMPLIANCE INVESTIGATION

FORMOSA PLASTICS CORPORATION – TEXAS (FPC-TX)
Point Comfort, Texas

Facility Address:

Formosa Plastics Corporation - Texas
201 Formosa Drive
P.O. Box 700
Point Comfort, Texas 77978
361-987-7000

Investigation Dates:

November 17 through 20, 2003
February 2 through 12, 2004
April 29, 2004

Lead Investigators:

Ken Garing, Environmental Engineer
Joe Wilwerding, Environmental Engineer

NEIC

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Table 9

EXCESS EMISSIONS JANUARY 2001 THROUGH SEPTEMBER 2003
Formosa Plastics Corporation
Point Comfort, Texas

Pollutant	Total Hours of Emitting Excess	Total Excess Emissions (lbs.)
CO	3,026	94447
NOx	697	10866

Table 10

MAJOR CO EXCESS EMISSION SOURCES JANUARY 2001 THROUGH SEPTEMBER 2003
Formosa Plastics Corporation
Point Comfort, Texas

Emission Point Number	Description	Permit Limit (lbs./hr)	Total Hours of Emitting Excess	Total Excess CO Emissions (lbs.)
H02B	Polyethylene plant thermal incinerator B (HDPE)	15.42	33	37618
Stack 5	Unit 1	19166	31	17541
H923A	Polyethylene plant thermal incinerator A	15.42	703	11274
7E	Utilities gas turbine 5	59.13	21	7064
Stack 4	Unit 1	59.13	23	6128
6002C	Incinerator/scrubber system C	0.697	486	3386
1003	Olefins I plant cracking furnace 3	30.3	123	3034
7D	Utilities gas turbine 4	59.13	11	2286
LI-01	LLDPE thermal incinerator	8.98	440	1796
6002B	Incinerator/scrubber system B	0.697	144	971

LEAK DETECTION AND REPAIR

LDAR Regulatory Summary

Formosa is subject to three federal LDAR regulations at the Point Comfort plant under the Clean Air Act, as follows:

- 40 CFR Part 60 Subpart VV, Performance Standards for New Sources for Equipment Leaks (hereafter NSPS Subpart VV)
- 40 CFR Part 61 Subpart V, National Emission Standard for Equipment Leaks, as referenced by 40 CFR Part 61 Subparts F and J, National Emission Standard for Vinyl Chloride and Equipment Leaks (Fugitive Emission Sources) of Benzene (hereafter NESHAP Subpart V)
- 40 CFR Part 63 Subpart H, National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks (hereafter HON Subpart H)

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Table 11 shows, for each LDAR-regulated process unit, the unit name, abbreviation used by Formosa, and the total number of valves in light-liquid or gaseous service in the unit based on the facility recordkeeping database at the time of inspection. A specific Maximum Achievable Control Technology (MACT) standard which will regulate other hazardous air pollutant-containing equipment in Formosa's ethylene plant has been promulgated under 40 CFR Subpart 63 Subpart UU, but will not take effect for existing sources until 2006.

Table 11

UNIT VALVE COUNTS AND ABBREVIATIONS
Formosa Plastics Corporation - Texas
Point Comfort, Texas

Unit Name	Abbreviation	Total Valves
Chlor-alkali	C/A	644
Ethylene dichloride	EDC	1800
Ethylene glycol	EGVOC	2344
Gasoline hydrotreating	GHU	2493
High density polyethylene	HDPE	5394
High density polyethylene II	HDPE II	3827
Inland division/traffic & C3	INLANDIV/C3	1188
Linear low-density polyethylene	LLDPE	4105
Marine traffic	MT	1345
Olefins	OLEFINS	11415
Olefins II	OLII	11830
Polypropylene II	PPII	3276
Polypropylene	PPU/PPVOC	7957
Polyvinyl chloride	PVC	2459
Vinyl chloride monomer	VCM	7463
	Total	67540

Under operating permits issued by the TCEQ, Formosa is required to implement an alternative monitoring and repair program titled 28MID, at most facility process units. Formosa assembled Table 12 in order to track the applicability of each regulation to each process unit. According to Formosa environmental personnel, the most stringent requirements under each regulation are used for all component monitoring. In general, the 28MID program requirements are more stringent than federal NSPS Subpart VV and NESHAP Subpart V LDAR regulations.

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Table 12

LDAR REGULATORY APPLICABILITY TABLE PROVIDED BY FORMOSA
Formosa Plastics Corporation - Texas
Point Comfort, Texas

FORMOSA PLASTICS CORPORATION, TEXAS

INSPECTION PREPARATION GUIDELINES

FUGITIVE EMISSIONS MONITORING

Unit/Facility	NSPS	NESHAPS	HON	Method
Vinyl Plant Turbine (FRAME 6)	N/A	N/A	N/A	N/A
VCM Plant	Subpart VV	Subpart V	Subpart H	28 MID
PVC Plant	Subpart VV	Subpart V	N/A	28 MID
EDC Plant	Subpart VV	N/A	Subpart H	28 MID
Utilities Plant	N/A	N/A	N/A	N/A
IEM Plant	N/A	N/A	N/A	28 MID
Olefins I and II Plants	Subpart VV	Subparts J, V	N/A	28 MID
Ethylene Glycol Plant	Subpart VV	N/A	Subpart H	28 MID
Polypropylene I and II Plants	Subpart VV	N/A	N/A	28 MID
HDPE 1 Plant	Subpart VV	N/A	N/A	28 MID
HDPE 2 Plant	Subpart VV	N/A	N/A	28 MID
Marine Terminal Facility (Traffic)	Subpart VV	Subparts J, V	Subpart H **	28 MID
Linear Low Density Polyethylene Plant	Subpart VV	N/A	N/A	28 MID

* The Chlorine Unloading Station has been shutdown and non-operational for over 3 years.

** Applies only to tank DT-403 and ancillary equipment.

*** Applies only to the GHU Unit within Olefins.

Due to the overlapping nature of the regulations applicable to Formosa, NEIC assembled Table 13 to outline the monitoring and repair requirements for valves and pumps. Used in combination with Table 12, Table 13 shows the monitoring and repair requirements for valves and pumps in specific plant process units. Formosa reportedly conducts quarterly valve monitoring in all regulated units.

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Table 13

MONITORING AND REPAIR REQUIREMENTS FOR VALVES AND PUMPS
Formosa Plastics Corporation - Texas
Point Comfort, Texas

Component Type/Service	Monitoring Frequency (M, Q, S, A)[1]			Leak Definition (ppm)			First Repair Attempt (days)			Final Repair/ Shutdown List (days)		
	NSPS Subpart VV NESHAP Subpart V	HON Subpart H	TCEQ 28MID	NSPS Subpart VV NESHAP Subpart V	HON Subpart H	TCEQ 28MID	NSPS Subpart VV NESHAP Subpart V	HON Subpart H	TCEQ 28MID [2]	NSPS Subpart VV NESHAP Subpart V	HON Subpart H	TCEQ 28MID [2]
Valves												
Gaseous Light-liquid	Q[3]	M[3]	Q[3]	10,000	500	500	5	5	5	15	15	15
Pumps												
Light-liquid	M	M	Q	10,000	1,000	500	5	5	5	15	15	15

1 *M - monthly, Q - quarterly, S - semiannually, A - annually*
2 *Repair attempts shall be made concurrently with monitoring to ensure that the lowest leak rate possible is obtained*
3 *If leak percentage greater than 2 percent; less frequently if lower leak percentage achieved*

LDAR Program Background

As shown in Table 11, Formosa maintains approximately 70,000 valves which are subject to federal, state, and/or permit leak detection and repair (LDAR) requirements. Subject equipment is located in 15 processing areas. Under the plant LDAR program, Formosa monitors for fugitive leaks of volatile organic compounds (VOCs) from valves, pumps, compressors, and other types of equipment using EPA Reference Method 21 (40 CFR Part 60 Appendix A).

Formosa has hired Environmental Analytics Inc. (EAI) to perform monitoring and first repair attempts to some components under the facility LDAR program. Monitoring is reportedly performed using TVA-1000 instruments. Formosa employees performed the LDAR work until 1997, when EAI was first hired. EAI reportedly performed some retagging after being hired, and continues to hang tags in new process units or in existing units where tags are missing.

If first repair attempts fail, EAI submits a work request to Formosa's maintenance department. Maintenance usually informs EAI of repair attempts so the contractor can aid in fixing the leak (by determining the source/size of the leak after repair attempts are made) and confirm a final repair has been made. Maintenance personnel reportedly also use a soap-bubble solution to aid in fixing leaks if EAI personnel are unavailable. In this case, EAI monitoring technicians reportedly return to the repaired component for a Method 21 confirmation reading.

Under the TCEQ 28MID program, Formosa is required to perform directed maintenance—monitoring while repairs are made—in order to obtain the greatest leak reduction possible. (Formosa is allowed to use favorable emissions factors for reporting annual emissions from equipment leaks under the TCEQ 28MID program.) Specific conditions in Formosa unit operating permits state "A directed maintenance program shall consist of the repair and maintenance of components assisted simultaneously by the use of an approved gas analyzer such that a minimum concentration of leaking VOC is obtained for each component being maintained" [Appendix K].

Exempt (b)(4)

Recordkeeping and Reporting

Formosa uses the LEAKDAS® database software to manage information pertaining to its LDAR program. According to EAI personnel, the FEMS® database software was used until 1999 to manage monitoring and repair information for the LDAR program, after which time EAI switched to the LEAKDAS® software. The database functions as the central repository for regulatory applicability, monitoring frequency, repair history, and other information required to be maintained under applicable LDAR regulations, and is the primary source of information for periodic reports submitted by Formosa. NEIC received copies of Formosa's LEAKDAS data tables for 1999 through November 2003, and reviewed the information for compliance with state and federal LDAR regulations.

Monitoring/Remonitoring Requirements

Under the TCEQ 28MID program, Formosa typically performs monitoring of light-liquid and gaseous-service valves on a quarterly basis, in all process units. However, NSPS Subpart VV and NESHAP Subpart V impose additional requirements for quarterly monitoring frequencies. Under 40 CFR § 60.482-7(c)(1) and 40 CFR § 61.242-7(c)(1), any valve for which a leak is not detected for 2 successive months may be monitored the first month of every quarter, beginning with the next quarter, until a leak is detected.

Exempt (b)(4)

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Under NSPS Subpart VV section 60.482-7(c)(2), Formosa must monitor valves which have leaked above the 10,000-ppm regulatory threshold on a monthly basis, until the valves have not leaked for at least 2 consecutive months.

EXEMPT (b)(4)

Repair Requirements

HON Subpart H section 63.168(f)(2) requires Formosa to make a first repair attempt to subject valves leaking above 500 ppm within 5 days after identification of the leak [Table 13]. The 5-day first repair attempt requirements, under NSPS Subpart VV and NESHAP Subpart V, apply only to leaks greater than or equal to 10,000 ppm in subject plant areas.

EXEMPT (5)(4)

Under HON Subpart H, Formosa is required to make the repairs or delay-of-repair (DOR) designation within 15 days, and similar requirements under NSPS Subpart VV or NESHAP Subpart V apply only to leaks greater than or equal to 10,000 ppm in subject plant areas.

EXEMPT (5)(4)

Reporting Requirements

On most all semiannual submittals for HON Subpart H, NSPS Subpart VV, and NESHAP V, Formosa has reported leak percentages for each month monitoring was conducted. Because Formosa has chosen to monitor all process units on a quarterly basis (as opposed to less frequently based on a percentage of valves leaking), calculation and reporting of leak percentages is not required on NSPS Subpart VV and NESHAP V submittals.

EXEMPT (5)(4)

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Calculation and reporting of valve leak percentages *is required* under HON Subpart H.

EXEMPT (5)(4)

Under 40 CFR § 63.168(e)(3)(i), Formosa is only allowed to exclude non-repairable valves which total less than 1 percent of the total number of regulated valves in the unit in the leak percent calculation for the period.

EXEMPT (5)(4)

HON Subpart H requires the percentage of leaking valves to be reported as the average of the percentage of leaking valves from the most recent two monitoring periods (two-period rolling average).

EXEMPT (5)(4)

Investigation Monitoring/Field Audit Results

NEIC performed comparative, VOC monitoring in Formosa process units and audited field-related activities managed under the facility's LDAR program. Using NEIC procedures, representatives from EPA Region 6 and TCEQ Region 14 also collected field monitoring data during the inspection. Results from all parties (NEIC, EPA Region 6, and TCEQ Region 14) are presented in this report. All monitoring was conducted using Foxboro Toxic Vapor Analyzers (TVAs), model 1000, which were calibrated daily using certified methane-in-air calibration gases, in accordance with NEIC operating procedures. Monitoring and field audit results are tabulated in Appendix Q.

NEIC and/or EPA Region 6/TCEQ personnel (hereafter "Agency personnel") identified an open-ended line and missing/unreadable component identification tags during the field inspection. Section 63.167(a)(1) under HON Subpart H, section 60.482-6 under NSPS Subpart VV, and section 61.242-6 under NESHAP Subpart V require a secondary closure device on all open-ended lines, in order to minimize hydrocarbon leaks through the valve body.

EXEMPT (5)(4)

Formosa monitoring personnel typically use the LDAR identification tags to locate equipment for monitoring. If identification tags are missing or unreadable, or if there are multiple identification tags present, tracking the appropriate information to ensure monitoring is conducted can become difficult.

EXEMPT (5)(4)

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EXEMPT(b)(4)

[5] *In general, NEIC does not include leaks which cannot be confirmed using company instruments in leak rate comparisons. However, in cases where known causes prevent a leak confirmation (e.g., if a leak were repaired before confirmation could occur), NEIC retains the leak in c*
unconfirmed leaks arose during the field audit at Formosa and were re

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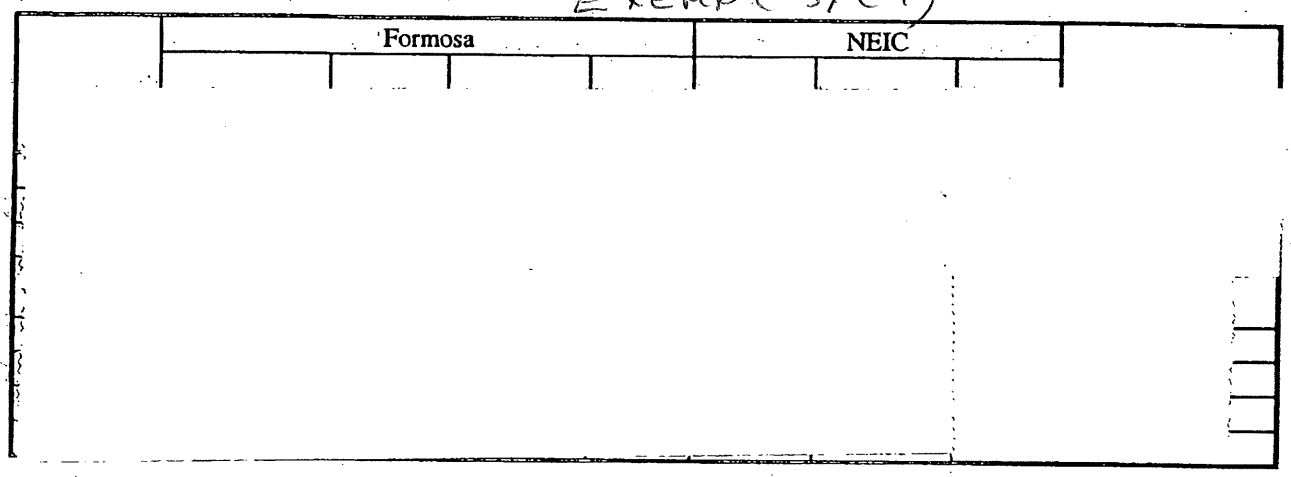
with NEIC calibration gases, in accordance with NEIC operating procedures, before monitoring was performed on November 17, 2003.[6]

Table 14

NEIC MONITORING RESULTS COMPARISON
Formosa Plastics Corporation - Texas
Point Comfort, Texas

EXEMP (5)(4)

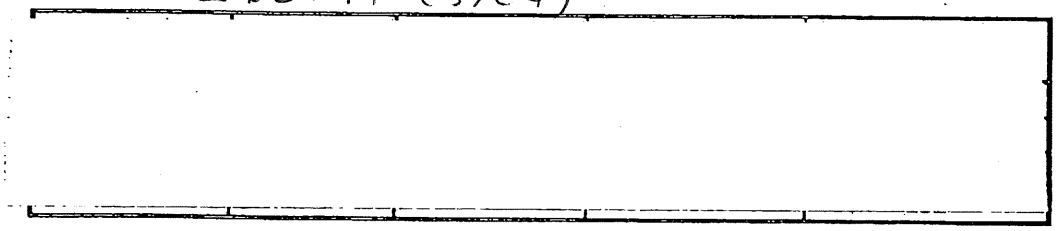


1 *One leak assumed in order to prevent an infinite result in the Leak % Ratio calculation; not included in the total number leaking for Formosa*

Table 15

EPA REGION 6 AND TCEQ REGION 14 MONITORING RESULTS
Formosa Plastics Corporation - Texas
Point Comfort, Texas

EXEMPT (5)(4)



EXEMPT (5)(4)

6 *In order to evaluate the ability of EPA Region 6 and TCEQ Region 14 personnel to identify leaking components, NEIC observed monitoring by both parties to ensure appropriate equipment leak interface points were monitored for sufficient time (in general, an inability to identify leaks results in a conservative comparison of leak rates between regulatory- and company-collected information). NEIC believes the monitoring conducted by EPA Region 6 and TCEQ Region 14 personnel to be accurate and correct, based on observation of the non-NEIC personnel conducting monitoring, veri prior to use, and confirmation of testing results by Formosa personnel.*

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EXEMPT (5)(4)

Table 16

AGENCY-COMBINED MONITORING RESULTS COMPARISON
Formosa Plastics Corporation - Texas
Point Comfort, Texas

Unit	Formosa				Agency			Leak % Ratio: Agency/Formosa
	Monitored Month	No. Leaking	No. Monitored	Leak %	No. Leaking	No. Monitored	Leak %	
	Aug 2003	2	8122	0.02%	2	855	0.23%	9.5
	Jul 2003	4	2525	0.16%	3	307	0.98%	6.2
	Apr 2003	110	13853	0.79%	24	654	3.67%	4.6
	Jun 2003	1[1]	1275	0.08%	4	407	0.98%	12.5
	Jun 2003	20	4190	0.48%	15	368	4.08%	8.5
	May 2003	31	5541	0.56%	20	649	3.08%	5.5
	May 2003	16	3410	0.47%	9	292	3.08%	6.6
Totals		**183**	**38916**	**0.47%**	**77**	**3532**	**2.18%**	**4.6**

[1] *One leak assumed in order to prevent an infinite result in the Leak % Ratio calculation; not included in the total number leaking for Formosa*

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EXEMPT (5)(4)

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BENZENE WASTE NESHAP EVALUATION

Introduction

The purpose of the benzene NESHAP regulation (Subpart FF) is to control benzene emissions released during the collection and treatment of waste streams containing benzene. Benzene, along with other volatile organic compounds (VOCs), evaporates from process wastewaters as they are transported through the sewer collection system. Benzene continues to evaporate as the wastewaters are treated at a wastewater treatment plant. Subpart FF regulations are designed to ensure that wastewaters are handled in a manner to minimize benzene emissions and so that the volatilized benzene will be collected and/or destroyed.

The requirements of the Benzene NESHAP apply to four industries: chemical manufacturing plants, coke by-product recovery plants, petroleum refineries, and off-site hazardous waste treatment, storage, and disposal facilities (TSDF). Formosa's chemical complex in Point Comfort, Texas, is chemical manufacturing, and, therefore,, is an "affected facility" subject to the provisions of Subpart FF.

Affected facilities were initially required to calculate the total annual benzene quantity (TAB) generated at the facility and to report this value by January 7, 1993 or by initial startup of a new source. Depending upon the calculated TAB quantity, different Subpart FF provisions applied. For facilities with TABs greater than 1 Mg/yr. but less than 10 Mg/yr., the regulation only requires an annual update of the TAB be submitted. Prior to April 6, 2001, Formosa reported TAB values between 1 and 10 Mg/yr.

For facilities with TABs greater than 10 Mg/yr., the regulation requires control equipment must be installed, operated, monitored, and TAB reports be updated annually. The specific information required in the annual update varies depending on the compliance option selected by the facility. Since reporting year 2000 (the April 6, 2001 TAB submittal) Formosa reported TAB values in excess of the 10 Mg/yr. threshold. The TAB values have increased each year from 10.44 to 36.84 Mg/yr., principally from the addition of the second olefins unit. Formosa has installed control equipment and treatment processes to handle benzene wastes.

Generally, one of two compliance options are used, either the 2 Mg Option [40 C.F.R. § 61.342(c)(3)] or the 6 Mg Option [40 C.F.R. § 61.342(e)]. Depending upon the compliance option selected, the waste streams that require treatment and the waste management units that do not have to meet control standards differ slightly.

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